

Tentative Chemistry Syllabus (subject to change)
Matter & Minerals (2005/06)

Text: "Chemistry", 6th edition, by Steven Zumdahl & Susan Zumdahl, Houghton Mifflin Co., New York, ISBN: 0-618-61032-4

Quarter	Chapter	Title	Concepts
Fall	2 (& 1)	Atoms, Molecules & Ions	Chemistry as the study of matter Classification of matter Density, temperature, dimensional analysis & unit conversions History of chemistry Physical/chemical properties Dalton's atomic theory Structure of atoms & modern view Isotopes, molecules & Ions Introduction to the periodic table Naming simple compounds
Fall	3	Stoichiometry	Atomic mass The mole Molar Mass Conversion between grams, moles, and number of atoms/molecules Chemical equations Stoichiometric calculations Percent mass Limiting reagents Empirical & molecular formulae Percentage yield
Fall	4	Types of reactions & solution chemistry	Definitions of solute, solvent & solution Strong/weak electrolytes Molarity & Preparing solutions Types of chemical reactions Net ionic equations
Fall	7	Atomic Structure & Periodicity	Electromagnetic radiation Atomic spectrum of hydrogen Bohr model of the atom The quantum model of the atom Quantum numbers Orbitals Electron spin & Pauli exclusion principle Multi-electron atoms The periodic table Aufbau principle Periodic trends, atomic properties, properties of the group
Fall	8	Bonding – General Concepts	Types of chemical bonds Electronegativity Bond polarity & dipole moment Ions Formation of binary compounds Covalent bonds Lewis dot structures Resonance structures VSEPR theory

Winter	9	Covalent bonding - Orbitals	Hybridization model Molecular orbital model Bonding in homonuclear/heteronuclear diatomics Localized electron model
Winter	6	Thermochemistry	Energy, enthalpy & calorimetry Hess's law Standard enthalpies of formation
Winter	13	Chemical equilibrium	The equilibrium concept & Equilibrium constant Equilibrium expression using pressures Heterogeneous equilibria Applications of the equilibrium constant Le Châtelier's principle
Winter	14	Acids & Bases	Definitions of Arrhenius & Bronsted-Lowry PH of strong/weak acids and bases Polyprotic acids Acidity/basicity of ionic compounds Lewis acid/base model
Winter	15	Applications of Aqueous Equilibria	Common ion effect Buffers Titrations & pH curves Acid-base indicators Solubility equilibria and solubility product Precipitation and qualitative analysis
Spring	5	Gases	Properties of gases & pressure Gas laws Gas stoichiometry Dalton's law of partial pressures Kinetic molecular theory Effusion and diffusion Real gases
Spring	12	Chemical Kinetics	Definition of reaction rate Rate law & the Integrated form of the rate law Reaction mechanism Catalysis
Spring	16	Spontaneity, Entropy & Free energy	Spontaneous processes and entropy Second law of thermodynamics Free energy Entropy changes in chemical reactions Free energy and equilibrium/work
Spring	17	Electrochemistry	Galvanic cells Standard reduction potentials Cell potential, electrical work and free energy Batteries Corrosion Electrolysis
Spring	18	The Nucleus: A Chemist's View	Nuclear stability and radioactive decay Kinetics of radioactive decay Nuclear transformations Detection and uses of radioactivity Stability of the nucleus Nuclear fission and nuclear fusion

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